



Application No. 10/689,995

Amendments to the Drawings:

The attached replacement drawing sheets provide formal drawings for Figs. 10-14.

Attachment: Replacement Sheets (4)

REMARKS

Claims 2-7 are pending in this application. The Office Action objects to the drawings, objects to the specification, objects to claim 4, rejects claims 1 and 2 under 35 U.S.C. §102 and rejects claims 3-6 under 35 U.S.C. §103. By this Amendment, the drawings, the specification and claims 2-4 are amended. Claim 1 is cancelled and claim 7 is added. No new matter is added. In consideration of the following, reconsideration of the application is respectfully requested.

I. Objection to Drawings

The Office Action objects to Figures 10-14 as allegedly not being properly labeled as prior art under MPEP §608.02(g), because only that which is old is illustrated. Applicant respectfully submits amended drawings to comply with MPEP §608.02(g). Accordingly, reconsideration and withdrawal of the objections are respectfully requested.

II. Objection to Specification

The Office Action objects to the Abstract for informalities. By this amendment, the Abstract has been amended to correct these informalities and obviate this objection. Accordingly, reconsideration and withdrawal of the objection are respectfully requested.

III. Objection to Claims

The Office Action objects to claim 4 for informalities. By this amendment, claim 4 has been amended in accordance with the Examiner's recommendation to obviate this objection. Accordingly, reconsideration and withdrawal of the objection are respectfully requested.

IV. Rejection under §102

The Office Action rejects claims 1 and 2 under 35 U.S.C. §102(b) over Japanese document 10-225881 to Okamoto. The subject matter of original claim 1 has been

incorporated into amended independent claims 3 and 4. Claim 2 now depends from claim 3 and claim 1 has been cancelled. Applicants respectfully traverse this rejection.

Although Applicants do not necessarily agree with the rejection, in the interest of advancing prosecution none-rejected claims 3 and 4 are amended to incorporate the subject matter of claim 1. In view of this amendment, the rejection under §102 is now moot. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

V. Rejection under §103

The Office Action rejects claims 3-6 under 35 U.S.C. §103(a) over Okamoto. In view of the following, Applicant respectfully traverses this rejection with respect to amended claims 3 and 4 and dependent claims 2, 5 and 6.

The Office Action asserts that Okamoto discloses all features of claims 3 and 4 except for the specific arrangement of links. The Office Action concludes that it would have been obvious to one ordinarily skilled in the art at the time the claimed invention was made to arrange the links as recited in claims 3 and 4. Applicant disagrees.

Although the Office Action summarily concludes that Okamoto discloses all features of original claim 1, the Office Action does not specifically assert or cite to any portion of Okamoto that discloses the claimed feature of coaxial joints and diagonal joints that connect two adjacent links and simultaneously allow the two adjacent links to pivot about a rotational axis that is coaxial with the axes of the two adjacent links and to pivot about another rotation axis inclined at an angle of 45° to the axes of the two adjacent links. Likewise, the Office Action does not specifically assert or cite to any portion of Okamoto that discloses the claimed feature of a specific link. In fact, a close examination of Okamoto reveals that nowhere does the reference teach, or even suggest, at least these features of the claimed invention.

The Office Action alleges that the joints disclosed in Okamoto read on the claimed joint and link structure. Similarly, the Office Action alleges that a generic link between two angled joints in Okamoto reads on the specific link of the claimed invention. However, the structure of the joints and links, specifically the two adjacent links and the specific link, in the claimed invention is distinct and advantageous over Okamoto. Foremost, there is no suggestion in Okamoto that the angled links are inclined at 45° as in the claimed invention. Tilting the rotational access of the pivot joints connecting the adjacent links necessitates that the specific link will be perpendicular to the two adjacent links as noted throughout the instant specification. In contrast, the disclosure of Okamoto is void of at least the 45° diagonal angle of inclination limitation. The disclosure of Okamoto illustrates this point. For example, the Figures of Okamoto clearly indicate the lack of "U-shape" functionality, which the 45° diagonal angle of inclination limitation as applied to the adjacent-specific-adjacent link combination of the claimed invention clearly provides.

Moreover, a close reading of Okamoto further indicates that Okamoto teaches a configuration that is very different from, and would not have rendered obvious, the claimed invention. For one, Okamoto teaches at least ten links, whereas the claimed invention recites only six (i.e., the claimed first to sixth links). This difference is important at least because the use of at least ten links makes Okamoto's configuration much more difficult to use in real time, as compared to the claimed six link arrangement. And, as discussed in detail above, Okamoto's lack of "U-shape" functionality actually prevents the operability the Okamoto manipulator in viable work area.

Finally, it is unreasonable to assert that any Okamoto links read directly, or indirectly, on the specific link, the two adjacent links and the adjacent-specific-adjacent link combination of the claimed invention. This is because Okamoto neither teaches nor suggests

the specific requirements of the claimed coaxial and diagonal joints nor teaches or suggests the specific requirements of the claimed adjacent-specific-adjacent ordering.

For at least these reasons, Okamoto does not teach, or even suggest, all features of amended claims 3 and 4. Moreover, the Office Action does not assert that the deficiencies discussed in detail above would have been obvious to one ordinarily skilled in the art. Nowhere does Okamoto teach or suggest that Okamoto's configurations could or should be modified to practice the claimed invention, such as by using the specific link configuration and by using only six links rather than at least ten links. Thus, Okamoto could not possibly have rendered obvious all features of the claimed invention.

However, even if Okamoto did teach all features of the claimed invention except for the specific arrangement as alleged in the Office Action, the specific arrangement would still not have been obvious to one of ordinary skill in the art. As noted throughout the instant specification, the specific configuration, discussed in detail above, and the specific arrangement provide for functional superiority over Okamoto.

In particular, for example, as shown in Fig. 3 of the instant specification, the adjacent links, C2 and C5, can be parallel and the height of the articulated manipulator can be small even though the articulated manipulator has a large work volume between the base and terminal points of the manipulator. Moreover, it is important to note that if the pivot rotational axis is inclined at an angle greater or lesser than 45° , then the adjacent links would not be parallel and the "U-shape" would not be possible. In this case, a problem inherent in Okamoto is exemplified. Without the claimed configuration and requirements, the adjacent links would either interfere with one another (for angles of inclination $> 45^\circ$) or separate, increase the height of the manipulator and fail to maximize use of available work area (for angles of inclination $< 45^\circ$) as is the case in Okamoto.

Furthermore, the use of 45° diagonal joints permits the adjacent links to be extended perpendicular to each other or in the same vertical plane to encompass three-dimensional work volume and reduce lateral size (see, for example, pg. 4, lines 33 - pg. 5, line 23). Finally, the simplicity of congruent diagonal joint angles (45°) in the manipulator structure allows for duplicative arithmetic processing during desired positioning and orientation of the module. This simplified processing model engenders superior processing speed and accuracy over Okamoto.

Thus, it is unreasonable to assert that Okamoto could possibly teach, suggest, or have rendered obvious the features of amended claims 3 and 4. For at least the reasons stated above, Applicant submits that claims 3 and 4, and all claims that depend therefrom, overcome the §103 rejection. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

VI. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of this application are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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Attachments:

Petition for Extension of Time
Replacement Sheets (4)
Abstract

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